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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/601,872	06/24/2003	Won-Bong Choi	030681-521	1325

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EXAMINER	
YUAN, DAH WEI D	

ART UNIT	PAPER NUMBER
1745	

MAIL DATE	DELIVERY MODE
01/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/601,872	CHOI ET AL.	
	Examiner	Art Unit	
	Dah-Wei D. Yuan	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 13-30* is/are pending in the application.

4a) Of the above claim(s) *17-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 13-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20060819* .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

CARBON NANOTUBES FOR FUEL CELLS, METHOD FOR MANUFACTURING THE SAME, AND FUEL CELL USING THE SAME

Examiner: Yuan S.N. 10/601,872 Art Unit: 1745 January 25, 2007

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 17, 2006 has been entered. The specification was amended. A Declaration under 37 C.F.R. § 1.132 was received.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on July 19, 2006.

Specification

3. The amendment filed October 17, 2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: [a]s also illustrated in FIG. 4, branched carbon nanotubes 20 are illustrated branching off from a main carbon nanotube 21. It is noted that as illustrated in FIG. 4, dispersed catalytic metal particles 22 are on surfaces of both the main and branched carbon nanotubes. It is also noted that the amendment is not consistent with the

disclosure: "[i]n FIG. 4, numerous metallic catalyst particles are uniformly distributed on the internal and external walls of the carbon nanotubes, wherein metallic catalyst particles adsorbed onto the external wall are illustrated as black dots, and metallic catalyst particles adsorbed onto the internal wall are illustrated as gray dots.". See page 5, Lines 18-22.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 102/103

4. Claims 1-4,13-16 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Dodelet et al. (US 6,887,451 B2).

With respect to claims 1,3, Dodelet et al. teach carbon nanotubes which are grown over a carbon paper carrying nanosized catalyst. See Column 2, Line 34 to Column 3, Line 17. As disclosed in the instant specification, the use of hydrogen gas can convert metallic catalyst particles in oxidized form into reduced form, thereby increasing the activity of the catalyst particles and lead to the growth of branched carbon nanotubes. See page 6, lines 8-10. Dodelet et al. similarly teach the use of hydrogen and acetylene in the gaseous mixture to fabricate carbon nanotubes. Therefore, the formation of some branched carbon nanotubes in the final MWCNTs would have been essentially certain.

Furthermore, Dodelet does not specifically disclose the loading of the catalyst on the nanotubes. However, it is the position of the examiner that such properties of said material are inherent, given that the nanotubes disclosed by Dodelet et al. and the present application having similar chemistry and preparation procedure. A reference which is silent about a claimed

invention's features is inherently anticipatory if the missing feature is necessarily present in that which is described in the reference. Inherency is not established by probabilities or possibilities. In re Robertson, 49 USPQ2d 1949 (1999). Alternatively, it would have been obvious to one of ordinary skill in the art to adjust the catalytic concentrations of the nitrate salts ranging from 0.15 to 1.0 M in order to provide desirable concentration of the nano-sized catalyst between 0.3-5 mg/cm^2.

In addition, it is the position of the examiner that disclosure provides no evidence of criticality with regard to the concentration of the catalyst particles.

With respect to claim 2, Dodelet et al. teach the use of catalysts including Fe, Co and Ni, which can serve as catalysts for carbon nanotube growth and fuel cells. See Column 3, Lines 23-29; Column 4, Lines 31-36.

With respect to claim 4, it is the position of the examiner that such properties of said material are inherent, given that the nanotubes disclosed by Dodelet et al. and the present application are prepared by the same procedure, i.e., chemical vapor deposition.

With respect to claims 13-16, Dodelet et al. teach the use of nanotubes as the electrodes for fuel cells. See Column 1, Lines 9-17.

Response to Arguments

5. Applicant's arguments filed on October 17, 2006 have been fully considered but they are not persuasive.

Applicant's principle arguments are

The Declaration by the inventor differentiates the instant invention from the teaching of Dodelet et al.

In response to Applicant's arguments, please consider the following comments.

The Declaration provides insights into the processing steps with respect to the formation of carbon nanotubes, in which the argon purging is first carried at temperature up to 500°C in the reactor followed by synthesis of the nanotubes at 800°C in a hydrogen/acetylene environment. Subsequently, the temperature of the reaction chamber is reduced to room temperature by argon purging. Similarly, Dodelet et al. teach the formation of carbon nanotubes where the carbon paper (substrate) is first heated to 400°C in an argon atmosphere. The paper is then heated to about 800°C and a gas mixture including argon, hydrogen and acetylene is fed onto the reactor. See Column 3, Lines 6-17. Dodelet further discloses the straight nanotubes become curved and change their structure at their tips when the growth temperature suddenly dropped at the end of the growth session. The drop in reactor temperature, which leads to the formation of tortuous nanotubes, is also reported in the Declaration, where the temperature in the reactor is lowered by the purging of argon gas. It is conduced that both Dodelet et al. and the instant disclosure disclose a processing procedure that would lead to the formation of nanotubes having the same morphology and structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dah-Wei D. Yuan whose telephone number is (571) 272-1295. The examiner can normally be reached on Monday-Friday (8:00-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan, can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dah-Wei D. Yuan
January 25, 2007

DAH-WEI YUAN
PRIMARY EXAMINER